Tactical Airborne Oil Spill Remote Sensing - a New Operational Approach
The Needs

Since Deepwater Horizon multiple studies by Industry and Government (*) have all led to the same conclusion: Improved use of remote sensing is critical to oil spill response. The conclusions suggested that for the oil responder community an effective airborne platform is a must.

Despite these studies, little has been done to provide the responder community with effective aerial surveillance technologies. Still the current approach to fighting oil spills in the U.S. is focused on the response at the expense of early detection, on reactive rather than proactive approach.

(*) Industry and Government Agencies include:
- API - American Petroleum Institute
- IGOP – International Association of Oil & Gas Producers
- USCG, NOAA, BSEE, etc.

The conclusions of several studies suggest that an effective remote sensing platform should feature:

- Multiple sensors for complementarity/redundancy;
- Classification of Pollutants, no false-positive;
- Identification of oil targets as Recoverable or Non-recoverable;
- Georeferencing the targets and Tracking moving oil;
- Expansion of the operating window to low-light / bad weather conditions;
- Real time information - for tactical and strategic use;
- Data suitable for the Common Operating Picture and for Decision Makers;
- Readiness of Crew and Platform.
Intelligence on the Scene

POSEIDON MISSION SYSTEM

SENSORS
- SAT (Satellite Link)
- MBR (Maritime Broadband Radio)
- AIS (Automatic Information System)
- DF (Direction Finder)

DATA PROCESSING
- MULTIFUNCTION OPERATOR CONSOLE

COMMUNICATIONS
- DETECTION OF SURFACE FILMS (SLAR)
- HIGH DEFINITION AND THERMAL IMAGING (EO/IR)
- ABSOLUTE THICKNESS HOT SPOTS (MWR)
- OIL TYPE CLASSIFICATION (LFS)
- OIL APPEARANCE CODE SECURING EVIDENCE (VIS)
- MAPPING AND RELATIVE THICKNESS (IR/UV)
Intelligence on the Scene

STEP 1 - Far Range Detection

SLAR – SIDE LOOKING AIRBORNE RADAR

CLOUD PENETRATING X-BAND (~9.3GHz) REAL APERTURE RADAR

PRIMARY TOOL FOR SYNOPTIC, WIDE COVERAGE OIL SPILL DETECTION.

50 NM SWATH – 7,500 Sq. NM / HOUR

FUSION OF AIS DATA, SATELLITE IMAGERY, SLAR DATA IN GIS ENVIRONMENT
### Accurate Analysis of the Oil Spill

- **Multiple sensors for complementarity/redundancy**
- **Each sensor detects specific features of the spill for a precise target definition**
- **Night and day spill detection**

#### VIS - UV - IR - Fusion IR/UV

**Sensitive above 0.01 µm layers (UV) and 2 µm layers (IR).**

**Area / Position / Coverage % / Dimension / Relative Thickness**

**Drift / Spreading / Volume estimate**

#### MWR

**Absolute Thickness Measurement**

- 50 µm to 3 mm

#### LFS

**Oil Classification / Weathering Absolute Thickness Measurement**

- 0.1 µm to 20 µm

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**Waterfall Window Dimension:** 1.1 NM x 2000 FT (or 1 NM)
Intelligence on the Scene

STEP 3 – Data Processing

DATA ANALYSIS, FUSION AND GEOREFERENCED INFORMATION

- Area (NM²)
- Position (Lat, Lon)
- Coverage (%)
- Thickness Distribution (µm)
- Volume (Gal)
- Hot Spots
- Drift, Spreading (NM/h, NM²/h)
- Oil Classification
- Georeferencing
- AIS data fusion
Intelligence on the Scene

STEP 4 – Data Distribution

REAL TIME DATA LINK

• MBR - HIGH-SPEED AND HIGH CAPACITY MICROWAVE DIGITAL RADIO LINK
  • 15 Mbit
  • RANGE 70 NM @ 3,000FT

SATELLITE LINK

WEB BASED GIS DATA DISTRIBUTION

• The thickness map is originated with data acquired with IR/UV, MWR (20Hz scan frequency) and LFS (10Hz repetition rate) that measured the absolute thickness.
• Thickness data point are acquired every 4-9m (12-30ft).
Current Projects

Harvey Damage Assessment

- INFRARED IMAGE
- SLAR IMAGE
- GEOREFERENCED POLYGON
- TARGET LOCALIZATION
- HD VIDEO / THERMAL IMAGING
THANK YOU!

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